# MEASURING USER SATISFACTION OF AN E-LEARNING PLATFORM IN PROJECT MANAGEMENT AND TECHNICAL TRAINING

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**Abstract** - This conference present the preliminary results of a research that allowed us to measure E-learners' satisfaction with regard to i) their learning performance (results follow-up), ii) their asynchronous interactions (learning community), iii) the quality of course content (content), iv) the effectiveness of the electronic content delivery system (learner interface), v) and its level of adaptation (personalization).

**Index Terms** - E-Learning, Project Management, Technology Transfer, User Satisfaction, Technical Training.

## I. INTRODUCTION

Online courses are clearly becoming key components of many project management programs around the world and for technology transfer and technical training in organization [1]-[2]-[3]. This was confirmed also by two recent initiatives: an analysis of 75 innovative project management programs and a systematic review of emerging development and delivery trends for new project management training programs regarding new themes such as complexity among others [4]-[5]-[6]-[7]. Conducted as part of a major review of a specialized master's project management program, these initiatives provided convincing results. Out of 75 universities spread across four continents, more than 48% offered fully online programs and nearly 11% had hybrid programs [4]. These new approaches to knowledge and technical skills dissemination require that we develop new methods for assessing content, but also for group communications and the technological tools that support them [1]-[8]-[9]. This project is intended to validate a satisfaction measurement instrument of e-learning systems based on five criteria: the learning interface (LI), the learning community (LC), the content (C), the personalization of the learning content (P), and the learning performance monitoring system (PM).

## II. METHODOLOGY

### A. Methodological approach

We used a positivist methodological approach in this research. A literature review was first conducted to identify the variables of the model. This allowed us to retain the Wang's model [2]. We then systematically translated the items in five stages in accordance with best practices in this field as suggested by Vallerand [10]. We then drafted a questionnaire and pretested it until we reached comment saturation. The data compiled in that six-week period was then analyzed using statistical processing software. Results were analyzed in three steps. The first step involved verifying the consistency of internal variables. The second step involved subjecting the data to exploratory factor analysis to account for differences in target populations, namely in terms of academic setting, culture, etc. and the third step involved subjecting the data to a linear regression model.

### B. Data collection

The instrument was tested on graduate students at a leading school of public administration rather than on a group of workers in an occupational and technical training in an industrial environment, and in a multicultural environment including learners from Canada, Haiti, and Djibouti. Analysis of the data collected from 158 out of a possible 538 respondents from Canada (80%), Haiti, and Djibouti (20%) allowed us to rule on the reliability and the content discriminant and convergent validity of the variables.

## III. RESULTS

### A. Internal consistency

Table 1 compare the various forms of construct validity in Wang's [2] original model and the one we tested. Both sets of data are quite similar despite the fact that the model has been applied in very different setting. I would like to note, however, that one of our sample's constructs was different from that of Wang's original model. In our model, the personalization variable was not observed after exploratory factor analysis—the performance monitoring variable was. There are probably two reasons for this: on the one hand, professional training was not sanctioned by academic results, and on the other, the proposed learning scenario was relatively set in that learners were expected to complete it in full. This means that the model assumed learners were starting their project management training from the very beginning. These results surprised us, which is why we decided to follow up with another exploratory analysis, identifying five theoretically proposed variables. The

fifth variable then observed was the one we expected, i.e.,personalization.

Table 1: Comparaison of models

| | | Wang 4 factors | Babineau 4 factors | Babineau 5 factors |
|---|---|---|---|---|
| Item analysis and reliability estimates (Cronbach alpha) | Corrected item to total correlation (24 items) | 0,95 ($r > 0,4$; $P < 0.001$) | 0.96 ($r > 0,6$; $P < 0.001$) | 0.96 ($r > 0,6$; $P < 0.001$) |
| Identifying the factor structure Principal component factor analysis; varimax; orthogonal | Bartlett's sphericity test | $X^2$ : 2285; sig. 0.000 | $X^2$ : 2902; sig. 0.000 | $X^2$ : 2902; Sig. 0.001 |
| | Eigenvalue | > 1 | > 1 | 4>1 et 1>,86 |
| | Deleting item with loading factor < 0.6 or greater than 0.5 on two factors | 17 items (4 factors) | 17 items (4 factors) | 21 items (5 factors) |
| | Explained variance | 78% | 71% | 75% |
| Factor reliability (Cronbach alpha) | Learner interface (LI) | 0.90 | 0.93 | 0.94 |
| | Learning community (LC) | 0.95 | 0.92 | 0.92 |
| | Content (CO) | 0.89 | 0.90 | 0.90 |
| | Personalization (PE) | 0.88 | - | 0.84 |
| | Learning measurement (LM) | - | 0.88 | 0.88 |
| | Corrected item to total correlation | > 0.50 (17 items) | > 0.50 (17 items) | |
| Convergent validity | Learner interface (LI) | 0,5 | 0.57 | 0.66 |
| | Learning community (LC) | 0.75 | 0.59 | 0.67 |
| | Content (CO) | 0.58 | 0.63 | 0.63 |
| | Personalization (PE) | 0.58 | - | 0.68 |
| | Learning measurement (LM) | - | 0.46 | 0.64 |
| Discriminent validity | Number of times an item correlates higher with items of other factors than with items of its own theoritical factor. (Should be < 50%) | 14/216 (6,5%) | 27/216 (12,5%) | 33/216 (15,3%) |

**B. Model's predictive value and moderating effect**

A linear regression model was used to predict satisfaction (S) based on five criteria and five respondent characteristics. The criteria used were content (C), the learning interface (LI), performance monitoring (PM), personalization (P), and the learning community (LC). The five respondent characteristics used were origin (Region), number of online courses taken (NOC), years of project management experience (YE), project management role (Roles), and distance course results (Result). The model also took into account twenty-five double interaction terms. The terms were used to determine whether any of the five respondent characteristics had moderating effects on the relationships between satisfaction and the five criteria. To avoid multicollinearity problems caused by the presence of interaction terms in the model, non-categorical variables were standardized before being included in the regression analysis. A top-down variable-selection approach was used to obtain the final predictive model presented in this document.

The results show very strong relationships between user satisfaction and its determinants: the learning interface; the learning community; the content quality; the personalization; and the learner performance monitoring system (see Fig. 1) Note that the final model's adjusted coefficient of determination $(R^2_{adj})$ is 0.84407, so its predictive power should be quite good.

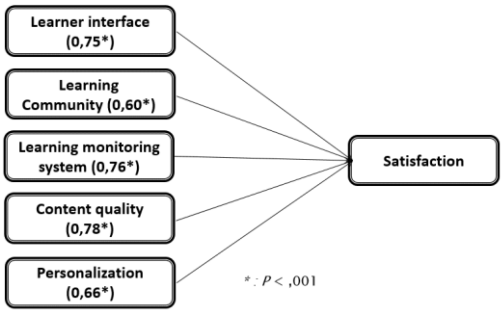



**Fig. 1: Link between criteria and satisfaction**

Table 2 provides an overview of all interaction terms between criteria and satisfaction and learner characteristics having a moderating effect on them. Team managers from project sponsor and executive of project owners that have higher content appreciation have also an higher satisfaction probably due to the fact that the content is coherent with their needs; non-canadian highly appreciate the forum, probably because they don't have proximity with others to communicate and discuss of project management stake without it. Finally, participant having had lower result have a higher appreciation of their asynchronous interactions and global satisfaction while those having had higher result present a reverse situation.

**Table 2: Moderating effect of criteria**

| | Learning interface | Learning community | Content | Persona-lization | Learning monitoring |
|---|---|---|---|---|---|
| **Culture** | | + | | | |
| *Canada* | | | | | |
| *Non canadian* | | + | | | |
| **Role in PM** | + | | + | | |
| *Team manager PS* | | | + | | |
| *Executive PS* | | | | | |
| *Team manager PO* | | | | | |
| *Executive PO* | | | + | | |
| *Teammate* | + | | | | |
| **Results** | + | - | | | |
| *E-learnin exp.* | | | | | |
| *Profesionnal exp.* | | | | | |

## CONCLUSIONS

Preliminary results allowed us to validate an instrument to measure E-learner satisfaction with an online course platform, helped us broaden its application for use with university graduate-level training programs rather than occupational and technical training and helped also to broaden its application in other cultural environments. The second phase of this research that involve a test-retest reliability of the instrument and a confirmatory analysis is underway.

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